AMENDED CLAIMS

1. Luminescent silica gel particles which contain one or more luminescent substances in a transparent silica gel matrix and exhibit at least one of the properties set out below:

a) the particle size is at least 0.5 µm;
b) the luminescent substance(s) is/are selected from the group consisting of luminescent organic compounds, up-converting phosphors and luminescent proteins;
c) they additionally contain a magnetic colloid;
d) the silica gel matrix has functional groups which can be coupled with biomolecules.

2. Particles according to Claim 1, characterized in that they are not self-fluorescent.

3. Particles according to Claim 1 or 2, characterized in that the said luminescent substance(s) are encapsulated in the particles.

4. Particles in accordance with any one of the preceding Claims, characterized in that the luminescent substance(s) is/are selected from the group of substances which display a fluorescence, phosphorescence, chemoluminescence, electroluminescence or a luminescence energy transfer.

5. Particles in accordance with any one of the preceding claims, characterized in that the concentration of the luminescent substances is 1 to 10%-wt.

6. Particles in accordance with any one of the preceding claims, characterized in that the luminescent substances display different emission frequencies.

7. Particles in accordance with any one of the preceding claims, characterized in that the luminescent substances are molecules whose excitation frequency is higher than the emission frequency.

8. Particles in accordance with any one of Claims 1 to 6, characterized in that the luminescent substances consist of semiconductor nanocrystals formed from elements of the Group IIIA and VA, Group IIB and VIA or Group IVA.

9. Particles in accordance with Claim 8, characterized in that the luminescent semiconductor nanocrystals are doped with copper and/or silver additives.

10. Particles in accordance with one of Claims 1 to 6, characterized in that the luminescent substances have excitation frequencies that are lower than the emission frequencies.

11. Particles in accordance with Claim 10, characterized in that the luminescent substances are microcrystalline compounds of rare earths and/or yttrium with elements from the Group VIA and/or VIIA.

12. Particles in accordance with any one of the preceding Claims, characterized in that the luminescent substances are metal-chelate compounds whose central atom has been chosen from the Group VIII, IB, IIB or the group of rare earths.

13. Particles in accordance with any one of the preceding Claims, characterized in that the luminescent substances are pyrrole dyes.

14. Particles in accordance with Claims 1 to 6, characterized in that the luminescent substances are luminescent proteins.

15. Luminescent polymer particles in accordance with any one of Claims 1 to 14 in which, in addition, a magnetic colloid is contained or has been encapsulated.

16. Particles in accordance with Claim 15, characterized in that the magnetic colloid is selected from the group comprising ferro-, ferri- and superparamagnetic compounds and ferrofluids.

17. Particles in accordance with Claim 15 or 16, characterized in that the magnetic colloid is present in a concentration of 10-50% by weight relative to the polymer particle.

18. Particles in accordance with any one of the preceding Claims, characterized in that the silica gels have functional groups that can be coupled to biomolecules, selected from the group comprising proteins, peptides, cell receptors, nucleic acids, nucleic acid fragments, polysaccharides, oligosaccharides, antibodies, antibody-fragments, streptavidin, avidin, biotin and enzymes, or that are coupled to one or more of such biomolecules.

19. Process for the production of luminescent silica gel particles which contain one or more luminescent substances in a transparent silica gel matrix, more particularly for the production of luminescent silica gel particles according to any one of Claims 1 to 18, characterized in that

a) a mixture consisting of a diluted acid and alkoxysilanes is condensed to a clear silica sol,

b) the clear silica sol is homogeneously mixed with one or more luminescent substances,

c) the sol-luminescence substance mixture is dispersed in an organic phase that is not miscible with water and

d) the sol-luminescence substance mixture is cross-linked during or after dispersion by adding a base.

20. Process for the production of luminescent, transparent silica gel particles in accordance with Claim 19, characterized in that 10-50% by weight of a ferro-, ferri- or superparamagnetic substance is added to the sol-luminescence substance mixture.

21. Process for the production of luminescent silica gel particles in accordance with Claims 19 and 20, characterized in that the organic phase that is not miscible with water contains one or more surfactive substances in a concentration of 0.1 to 15 % by volume

22. Process for the production of luminescent silica gel particles in accordance with any one of Claims 19 to 21, characterized in that the volume ratio of sol to organic phase is 1:5 to 1:30.

23. Process for the production of luminescent silica gel particles in accordance with any one of Claims 19 to 22, characterized in that the dispersion-cross-linking process takes 2 to 30 seconds.

24. Process for the production of luminescent silica gel particles in accordance with any one of Claims 19 to 23, characterized in that 1 - 20% by volume of an aqueous solution of an organic polymer, polysaccharide or protein is mixed with the sol before dispersion.

25. Use of luminescent silica gel particles containing one or more luminescent substances in a transparent silica gel matrix, more particularly the use of luminescent silica gel particles according to any one of Claims 1 to 18 or of silica gel particles produced according to any one of claims 19 to 24, for the analysis and/or diagnostic of nucleic acids, nucleic acid fragments, proteins, peptides, antibodies, antibody fragments, cells, cell receptors, biotinylated biomolecules and for testing protein or nucleic acid libraries, as sensors in the context of array technology or for nucleic acid sequencing.